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AUTHOR Pikula, Joan
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ABSTRACT

A study examined the effectiveness of semantic mapping instruction as a technique for increasing vocabulary. Subjects, 38 fourth grade students in two classrooms, were divided into experimental and control groups. Both groups were pretested for their knowledge of selected words taken from the Scott, Foresman Reading Program, Grade Four. The control sample was then taught vocabulary using the traditional dictionary technique suggested in the basal manual, and the experimental group was taught semantic mapping, involving the development of a network of semantic categories by the students using their existing knowledge of vocabulary. Posttest results at the end of the six-week period indicated no statistically significant difference between the two groups. However, the experimental group exhibited a great enough gain over the control sample to warrant replication of the study over a greater period of time. (Tables of results and references are included, and appendixes contain the vocabulary test, the list of target words, and the raw scores for the pretest and posttest.) (HTH)

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The Effects of Semantic Mapping on Vocabulary Growth in Grade Four

by

Joan Pikula

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ABSTRACT

This study was conducted with two classes of heterogenously grouped fourth graders. Each sample consisted of nineteen children. It was hypothesized that teaching vocabulary through the use of semantic mapping would increase the word knowledge of the experimental sample over the control sample. Sixty words were taught over a six week period.

Results indicated that although there was no statistically significant difference, the experimental sample exhibited a great enough gain over the control sample to warrant replication of the study over a longer period of time. Results further indicated that semantic mapping should be considered as an appropriate technique for teaching vocabulary.

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The importance of vocabulary development for effective reading has been recognized for years. The link between vocabulary knowledge and reading efficiency has been of continuous interest (Blachowicz, 1985). Dufflemeyer suggests that developing a close relationship between vocabulary and reading is one of the major responsibilities of the teacher in the classroom (1985). Mazynski (in Marzano, 1984) finds that the overall goal of vocabulary instruction should be to increase the number of words that a student can recognize automatically, through systematic, long-term instruction. Increased attention to vocabulary instruction adds to the fluency of the reader. The more vocabulary knowledge the reader can bring to the reading process, the better will be the comprehension of the printed material. It is generally accepted that increased word knowledge has a positive effect on comprehension.

Surveys of commercial reading programs suggest that reading materials offer little beyond perfunctory prereading instruction of unusual vocabulary (Blachowicz, 1985). Teachers need a variety of methodology made available to them in order to teach vocabulary successfully. Research into various methods of teaching vocabulary is needed. Such research should make available to teachers a variety of successful methods through which to accomplish the task of developing in readers a broad base of word knowledge which they can bring to the act of reading. Current basal context approaches may be effective in preparing for the basal stories, but they do not go far enough. The use of additional methods to expand, develop and relate words to each other, helps to build a sizeable vocabulary successfully.

Methods to intensify the amount and automaticity of responses to vocabulary words students learn include the technique of semantic map-

ping. This is a categorical structuring of information in graphic form (Johnson, et al, 1986).

Margasein, Pascarella and Pflaum, in 1982, compared a presentation of several related words and their meaning in context, with a presentation of the same words which included the technique of semantic mapping. The students discussed the relationships among the new words, as well as the definitions. The semantic mapping group showed significant advantage over the context-only group on a test of word knowledge and a standardized vocabulary test (McKeown, Beck, Omanson and Pople, 1985).

Based on these suggestions and findings, it seems that semantic mapping could be an effective technique for teaching vocabulary over typical methods taught in basal readers in the primary years.

HYPOTHESIS

To provide additional evidence on this topic, a study was conducted to determine the effects of semantic mapping instruction on the word knowledge of fourth grade students.

It was hypothesized that children who have been exposed to semantic mapping as a technique to develop vocabulary will achieve higher scores on a word knowledge test than a matched control group taught by a traditional basal method.

DEFINITIONS

Semantic mapping is a categorical structuring of information in graphic form. Individualized Content approach is one in which students are required to relate new words to their own experiences. Vocabulary Clusters are identified groups of semantically related words.

ASSUMPTIONS

It is assumed that the children understand the concept of classify-

ing, that the children have the required skills necessary for learning the semantic mapping technique and that the children in both the experimental and control samples have established a working rapport with the respective instructors as well as among the sample's members.

LIMITATIONS

The experimental sample consists of nineteen heterogenously grouped fourth grade students. The control sample consists of nineteen heterogenously grouped fourth grade students closely matched to the experimental sample. The research deals with a sampling of fourth grade students from a middle class, suburban community. Conclusions are not to be extended beyond this population.

PROCEDURES

Each sample was pre-tested in their knowledge of selected vocabulary words taken randomly from the Scott, Foresman Reading Program, Grade Four (1981).

The two samples were then exposed to six weeks of instruction in vocabulary. The control sample was taught using the traditional dictionary technique suggested in the basal manual. This included looking up the words in the glossary, using the words in sentences and completing exercises in the accompanying vocabulary workbook.

The experimental sample was taught vocabulary using the semantic mapping technique as described by Johnson, et al (1986). The lessons were 30 minutes in length, three times a week. The technique involves the development of a network of semantic categories by the students, using their existing knowledge of vocabulary. The technique also includes direct teaching as well as active participation by the students in developing a semantic map.

Upon completion of the six week learning period, both samples were again tested in their knowledge of the vocabulary presented.

RESULTS

Table I

A Statistical Analysis of Pre and Post Test Scores

Table I indicates the results of Pre-test and Post-test scores for

Sample	M	SD	t
Pre-test			
Experimental	11.63	5.01	1.89 NS
Control	14.47	5.98	
Post-test			
Experimental	22.21	4.60	.24 NS
Control	23.11	4.98	

the experimental and control samples. The pre-test indicated a mean of 11.63 for the experimental sample and 14.47 for the control sample. Results of the post-test indicated a mean of 22.21 for the experimental sample and 23.11 for the control sample. The "t" test indicated that there was no significant difference between either the pre-test or post-test means at the .05 level of probability.

Results of the "t" test as shown in Table II indicated no signifi-

Table II

A Statistical Analysis of the Mean Growth of the Sample

Sample	M	SD	t
Experimental	10.58	4.56	1.68 NS
Control	8.53	2.76	

cant difference between the mean growth of the samples at the .05 level of probability. As can be seen, however, the experimental sample made a greater mean gain in this period.

CONCLUSIONS

The study was concerned with semantic mapping as an effective technique for developing vocabulary. A test of vocabulary knowledge was developed using randomly selected words from the Scott, Foresman Reading Series, Grade Four (1981). The subjects for the study were 38 heterogenously grouped fourth grade students.

Statistical analysis was concerned with a comparison of the means of the total raw scores of both samples, as well as a comparison of the mean growth of each sample. Statistical significance was evaluated by a "t" test. No statistical significance was indicated at the .05 level of probability.

It should be noted, however,that the mean growth of the experimental sample was higher than the mean growth of the control sample. This would seem to indicate some value in semantic mapping as a technique for teaching vocabulary.

There is enough evidence to suggest that the study be replicated over a longer period of time for more conclusive results.

Vocabulary Development: Related Research

Reading educators and psychologists have been asking questions about vocabulary learning for decades. This interest, for many, has been rooted in the fact that there is a sizeable correlation between vocabulary knowledge and reading comprehension (Davis, 1944 in Jenkins, et al, 1984).

There is general agreement among teachers and teacher educators that vocabulary instruction is an important part of the elementary curriculum (Johnson, Pittelman and Heimlick, 1986). Otto, McMenemy and Brown have stated, "...consensus regarding the need for systematic and extensive vocabulary development is unanimous among authorities in reading instruction..." (in Jenkins et al, 1978). Vocabulary knowledge is closely related to comprehension - readers need to be familiar with the meanings of most words they encounter (Beck, McKeown, 1983).

Research conducted by Eeds and Cockrum (1985), compared the effectiveness of three methods of teaching word meaning. One instructional method, teacher interaction, taught target words by helping students expand an already existing conceptual network; the second method, dictionary, had students pair the words to be learned with dictionary definitions; the third, control, had students read the words in a meaningful contest. The results of the study indicated the Teacher Interaction Method was significantly more effective than the other two. Word meaning instruction that helps learners fit new words into an already existing conceptual network is substantially more effective than having students look up words in a dictionary or read words in interesting or relevant contest. Data from this study also suggests that more new words will be learned and remembered if teachers add direct instruction in word meaning to their reading programs.

Preteaching words that are important to an understanding of the cen-

tral ideas in the text would be likely to result in improved comprehension of important ideas, whereas preteaching unimportant words would be likely to promote understanding of less important information (Wixson, 1986).

Stieglitz (1983) finds that new vocabulary items should be presented in known structures and, whenever possible, should be centered around one topic. Furthermore, single exposure to new words is inadequate. Words must be introduced and used many times in various situations before they can become part of a learner's functional English vocabulary.

Jenkins and Dixon (1983) state that no one really questions whether vocabulary can be taught. Commercial reading programs have settled on a position somewhere between intensive and laissez faire vocabulary instruction. This brings us to the more practical question then, of not so much whether vocabulary instruction should occur, but rather how to perform the task most efficiently and effectively.

Although vocabulary is an integral part of learning, teachers frequently do not have the time to define unfamiliar vocabulary, either in a reading class or within content area subjects. At most, a teacher may be able to focus on some critical words. These words may have no significance to the students and may be presented in an isolated format with no suggestion of a relationship among them (Carr, 1985).

Further research has shown that commercial reading programs do not emphasize vocabulary instruction. Program developers do not rely much on direct teaching to produce growth in vocabulary learning. It appears that vocabulary learning is unimportant or that it occurs chiefly through incidental learning and needs limited attention from teachers and programs (Jenkins and Dixon, 1983). When programs do prescribe vocabulary instruction, they recommend weak teaching procedures (Jenkins et al,

1984). Under such circumstances, Jenkins says, students may encounter new vocabulary only three times: once before reading a story when they are told meanings of unfamiliar words; again when the words appear in the story; and a third time in an independent seatwork exercise. Research on teacher effectiveness has established a clear relationship between direct instruction and student achievement (Blanton, Moorman and Wood, 1986). Durkin (1980) observed 4469 minutes of reading instruction in fourth grade classrooms and noted that teachers spent 19 minutes giving vocabulary instruction and only four minutes reviewing word meaning previously taught. The majority of teachers' involvement with vocabulary lessons (94 minutes) consisted of monitoring students workbook exercises supplied with the program. Furthermore, the results of a study by Pany,et al, 1982 (in Jenkins and Dixon 1983) demonstrate that raising the intensity of instruction directly affects the amount of vocabulary learned. In a systematic, long-term study of vocabulary teaching, Beck and her colleagues (in Jenkins and Dixon, 1983) made clear the realization that vocabulary instruction seems to require a lot of time and energy. (Their program consisted of thirty minutes of vocabulary instruction per day which resulted in 104 words taught over a five month period).

The most common approaches have been either to have the teacher tell students the meanings of new words before a story is read, to pair up new words with synonyms and have students memorize them, or (as is most often the case) to have students look up the meanings of the new words in a dictionary.

Sorenson (1985) writes that commercially prepared basal reading programs strongly influence the form and content of vocabulary instruction that accompanies the teaching of reading. She feels that although the

different basals present different vocabulary, the procedures for teaching vocabulary are fairly uniform. An examination shows that some of these procedures divert the attention of students and teachers away from the vital connection between learning and comprehension (Anderson and Freebody, in Sorenson, 1985). In listing six misconceptions about the learning of words, Sorenson (1985) emphasizes the fact that in a typical basal vocabulary lesson, the teacher introduces a printed word (usually in sentence context). Students read the word and attempt to explain its meaning or use it in a sentence. In some basal manuals, this is followed by a review exercise. This is most often where vocabulary teaching stops. Sorenson relates this one-time teaching to the concept of "monitoring" which Durkin (in Sorenson, 1985) considers a dominant characteristic of classroom reading instruction.

In a study to assess vocabulary as part of reading instruction, Jenkins and Dixon (1983), examined the vocabulary instruction as prescribed in the Scott, Foresman Reading Program (Aaron, 1981). Each unit lists glossary entries and the teacher is instructed to encourage students to use the glossary whenever they meet an unfamiliar word. The students are never formally tested on the glossary words. Classroom observations suggest that children rarely use their glossaries outside of prescribed exercises which require them to do so. In addition, there is a set of "other words". The teacher is to encourage the students to use the context to figure out the meanings. At the fourth grade level there are 281 glossary words and 222 "other words". Direct teaching activities are prescribed only for the "other words".

In a recent study of two basal reading programs, Beck, McKeown, McCaslin and Burkes looked at the strategies used to develop vocabulary

and concluded that neither frequency of encounters with the words presented nor the instructional strategies used were adequate to ensure that words were learned well (in Beck and McKeown, 1983). Jenkins and Dixon (1983) make the similar observation that vocabulary teaching as practiced in schools lacks both intensity and scope. The aforementioned analyses concur in their conclusions that the level of vocabulary instruction prescribed in commercial reading programs is modest, at best, and that most of the efforts "overlook some of the most elementary principles of teaching and learning - e.g., multiple examples, repetition and review."

Data from a study on vocabulary (Beck and McKeown, 1983) indicates that specific vocabulary instruction can successfully teach word meanings.

Blackowicz (1985) states that the "knowledge position" of theorists suggests that individuals who score well on vocabulary measures do so because of their conceptual knowledge, which is the real link to reading comprehension. This viewpoint emphasizes conceptual development and is in opposition to the "instrumentalist position" suggesting automaticity training through rote learning of words and their definitions. The "knowledge position" relies on words and concepts in relational categories. This position further asserts that knowing a single word implies knowing a lot of related words in large chunks of information. A new word is probably entered into an individual's store of concepts by attaching it to appropriate clusters of concepts (Marzano, 1984).

The Vocabulary Overview Method (Carr, 1985) trains students to establish a network of relationships among words and relate those words to personal experiences. Carr (1985) states that "Comprehension is increased when vocabulary is related to personal experience, thereby connecting the new term firmly to an individual's background knowledge."

Karen K. Wixson (1986) conducted a study which presented two methods of vocabulary instruction to groups of fifth grade students. The dictionary method was designed to be representative of procedures found in traditional basal reading materials. This method, Wixson states, "...was relatively passive and relied heavily on practice activity." The students were asked to look up the definitions of the words in the dictionary, copy them and write a sentence for each word. In addition, they were given a worksheet and asked to fill in a crossword puzzle by choosing the best vocabulary words to complete a series of sentences. These are strategies commonly used with basal programs and are similar to activities found in workbooks.

The concept method was developed to assist students in learning words as concepts rather than as dictionary definitions. The activities in this method allowed for much more active participation on the part of the student. The method relied heavily on discussion.

The results of this study suggest that preteaching vocabulary enhances children's understanding of ideas related to the instructed vocabulary regardless of level of importance. The data also supports the growing evidence for the "direct effect" of instruction. The results of Wixson's study imply that preteaching unfamiliar vocabulary can have a direct effect on student understanding of specific ideas within a text.

Bridge (in Wixson, 1986) observed that instruction in new vocabulary should serve to activate previous conceptual associations and to provide new associations that help students relate unfamiliar concepts to familiar ones.

Beck, et al and McKeown, et al (in Wixson, 1986), did find that vocabulary instruction which provided "rich" opportunities for children to

develop the semantic network connections necessary to relate concepts resulted in improved comprehension.

Schema theory is a theory of knowledge. Rumelhart (in Eeds and Cockrum, 1985) states: "A schema contains, as part of its specification, the network of interrelations that is believed to normally hold among the constituents of the concept in question." Assuming that such networks exist, teaching new vocabulary by attempting to hook into an existing network (thus linking the new word or label to a previously learned concept) should result in greater learning and longer retention than more conventional methods (Eeds and Cockrum, 1985).

Semantic mapping is a categorical structuring of information in graphic form. It is an individualized content approach in that students are required to relate new words to their own experiences and prior knowledge (Johnson and Pearson, 1984). Semantic mapping employs the techniques of direct teaching, active student participation and relating words to an already developed repertoire of prior knowledge.

Steiglitz (1983) describes a closely related activity called semantic feature analysis. Prior to the actual analysis, however, the procedure (as developed by Johnson and Pearson, 1984) requires the teacher to elicit words from the students and place the words into appropriate categories.

The research of Klausemeir and Sipple (in Marzano, 1984) supports the implication that vocabulary words should be taught along with the semantic clusters to which they belong.

It can be seen that there is strong evidence regarding the link between vocabulary knowledge and reading comprehension. In addition, research shows that in general, basal series seem to be lacking in their

approach to teaching vocabulary. There is a need for teachers to have available a variety of successful methods for teaching vocabulary. Semantic mapping may be a useful technique in that it provides for direct teaching and active learning. Furthermore, semantic mapping allows the student to associate new vocabulary with a categorical structuring of prior knowledge. This methodology has been shown to be effective. There is a need to find out what must be taught to develop effective readers. We must then research various methods to determine how we can most successfully teach those things which need to be learned.

REFERENCES

Aaron, I.E. Scott, Foresman Reading. Glenview, Ill. Scott, Foresman, 1981.

Beck, Isabel L. and McKeown, Margaret G. "Learning words well - A program to enhance vocabulary and comprehension." The Reading Teacher. Vol. 36 No. 7. March, 1983.

Blackowicz, Camille L.Z. "Vocabulary development and reading. From research to instruction." The Reading Teacher. Vol. 38. No. 9. May, 1985.

Blanton, William E., Moorman, Gary B. and Wood, Karen D. "A model of direct instruction applied to the basal skills lesson." The Reading Teacher. Vol. 40. No. 3. December, 1986.

Carr, Eileen M. "The vocabulary overview guide: A metacognitive strategy to improve vocabulary comprehension and retention." Journal of Reading. May, 1985. pp. 684-689.

Dufflemeyer, Frederick A. "Teaching word meaning from an experience base." The Reading Teacher. Vol. 39. (October, 1985). pp. 6-9.

Durkin, D. "What classroom observations reveal about reading comprehension instruction." Reading Research Quarterly. 1979. 14. pp. 481-533.

Eeds, Maryann and Cockrum, Wared A. "Teaching word meanings by expanding schemata vs. dictionary work vs. reading in context." Journal of Reading. March, 1985. pp. 492-497.

Jenkins, Joseph R. et al. "Vocabulary and reading comprehension: Instructional Effects." (Technical Report No. 100). Bolt, Beranek and Newman Inc. Cambridge, Mass. Illinois Univ. Urbana. Center for the Study of Reading. August, 1978. pp. 50.

Jenkins, Joseph R. and Dixon, Robert. "Vocabulary Learning." Contemporary Educational Psychology. (1983). 8. pp. 237-260.

Jenkins, Joseph R. et al. "Learning vocabulary through reading." American Ed. Research Journal. Winter. 1984. Vol. 21. No. 4. pp. 767-787.

Johnson, Dale D., Pittelman, Susan D. and Heimlick, Joan E. "Semantic mapping." The Reading Teacher. Vol. 39. No 8. April, 1986.

Johnson, D.D., Toms-Bronowski, S. and Buss, R. "Fundamental factors in reading comprehension revisited." In L. Gentile and M. Kamil (Eds.) Reading Research Revisited. 1983. Columbus, Ohio. Charles Merrill.

pp. 247-255.

Marzano, Robert J. "A cluster approach to vocabulary instruction: A new direction from the research literature." The Reading Teacher. Vol. 38. No. 2. November, 1984.

Mason, Jana M., Kniseley, Elizabeth and Kendall, Janet. "Effects of polysemous words on sentence comprehension." Reading Research Quarterly. Vol. 15. No. 1. 1979. pp. 49-65.

Mayher, John S. and Brause, Rita S. "Learning through teaching: Teaching and learning vocabulary." Language Arts. Vol. 60. No. 8. Nov./Dec. 1983. pp. 1008-1019.

McKeown, Beck, Omanson and Pople. "Effects of vocabulary instruction." Reading Research Quarterly. Fall, 1985. pp. 522-531.

Pearson, David P. and Johnson, Dale D. Teaching Reading Vocabulary. 1984. Holt, Rinehart and Winston. New York.

Pittelman, Susan D. et al. "An investigation into two instructional settings in the use of semantic mapping with poor readers." Program report 85-4. Wisconsin Center for Education Research, Madison. Sept. 1985. pp. 38.

Smith, Richard J. and Johnson, Dale D. Teaching Children to Read. Addison-Wesley Publishing Co. Reading, Mass. 1980. pp. 510.

Sorenson, Nancy L. "Basal reading vocabulary instruction: A critique and suggestions." The Reading Teacher. Vol. 39. No. 1. October, 1985. pp. 80-84.

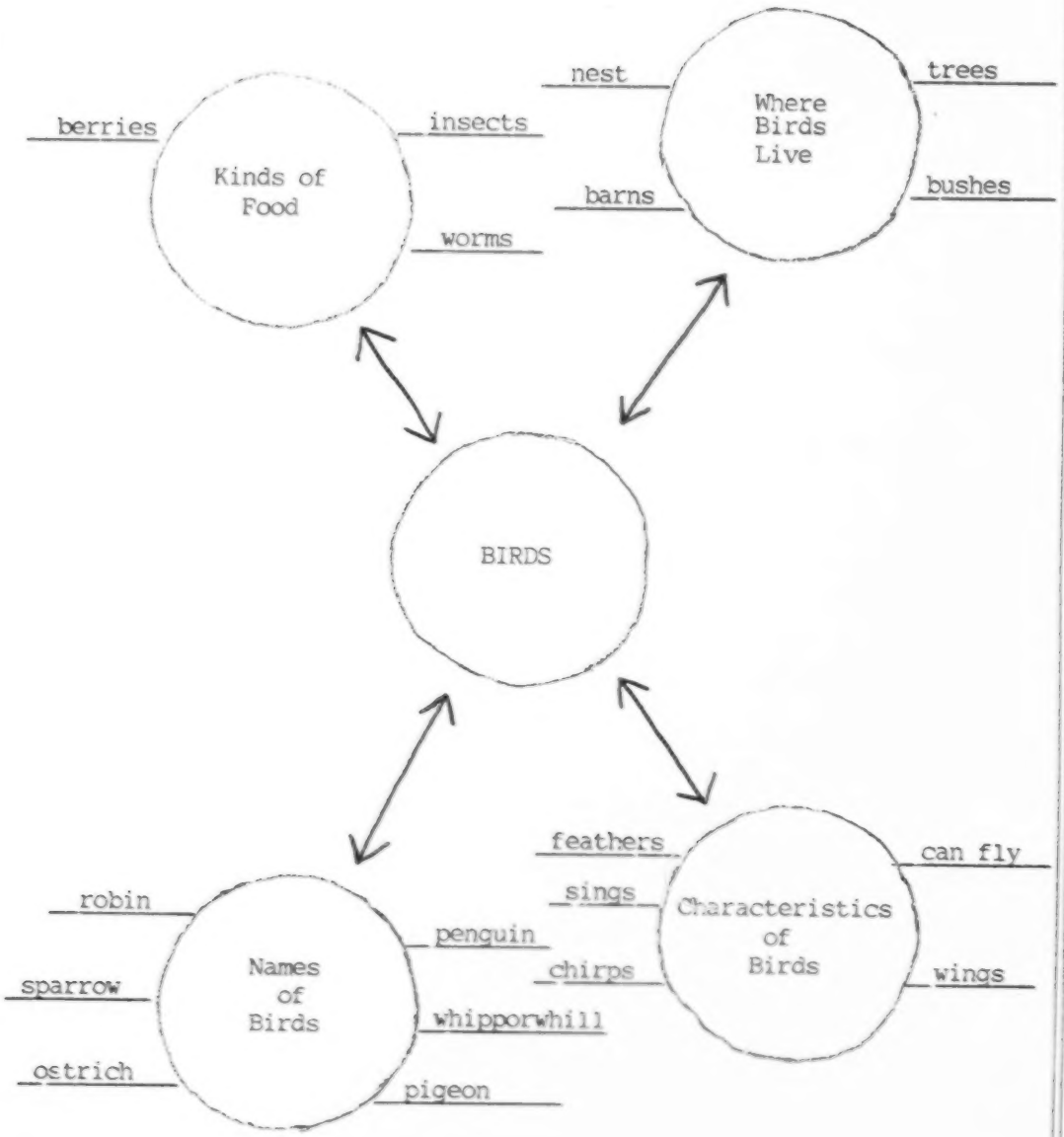
Stieglitz, Ezra L. "Vocabulary reinforcement." ELT Journal. Vol. 37/1. January, 1983. pp. 71-75.

Wixson, Karen K. "Vocabulary instruction and children's comprehension of basal stories." Reading Research Quarterly. Summer 1986. pp. 317-329.

APPENDICES

SAMPLE SEMANTIC MAP

SAMPLE SEMANTIC MAP



VOCABULARY TEST

Name:

Directions: Read each definition. Find a word in the word list that closely matches the definition. Write the number of the word on the line next to the definition.

_____ shook, trembled

_____ having a high pitch; high and sharp in sound

_____ place and time of a play or story

_____ very severe or unpleasant; cruel

_____ claiming or commanding effort or interest

_____ more than enough

_____ a small lizard that can change the color of its skin to blend with its surroundings

_____ tryouts testing the ability of a singer, actor, or performer

_____ an actor's part in a play

_____ recording a show or performance

_____ an advance showing of a picture, play or show

_____ an illusion in which some distant scene seems to be much closer than it actually is

_____ slightly salty

_____ various substances that can be shaped or molded when hot and become hard when cooled

_____ the sound portion of a broadcast

_____ a person who designs buildings

_____ shed the feathers, skin, hair or shell

_____ one of a group of warm-blooded animals with a backbone

_____ ship; large boat

_____ ccnsent to take; say yes

_____ the act of making up one's mind

_____ area of deep water forming a place of shelter for ships

_____ a small musical instrument, like a flute

_____ grassy land on which cattle, sheep, or horses can feed

_____ not bright; not clear

_____ apart from others; considered separately

_____ mounds or ridges of loose sand piled up by wind

_____ a long pole of wood or steel set upright on a ship to support the sails and rigging

_____ any pointed end or top

_____ smooth or arrange the feathers with the beak

WORD LIST

1. preview
2. quivered
3. setting
4. harbor
5. audio
6. challenging
7. shrill
8. brackish
9. plastic
10. pasture
11. chameleon
12. particular
13. decision
14. bountiful
15. auditions
16. preen
17. architect
18. vessel
19. dunes
20. script
21. harsh
22. taping
23. molt
24. mast
25. dim
26. accept
27. peak
28. mammal
29. fife
30. mirage

RAW SCORES: PRE AND POST TESTING

RAW SCORES

	Control Sample		Experimental Sample	
	Pre-test	Post-test	Pre-test	Post-test
1.	6	15	12	20
2.	6	16	13	28
3.	8	17	14	24
4.	10	19	5	16
5.	7	20	9	15
6.	14	22	13	18
7.	9	22	17	24
8.	13	22	5	19
9.	20	24	3	26
10.	16	24	11	26
11.	17	24	15	27
12.	13	25	23	27
13.	16	27	8	20
14.	20	28	10	24
15.	26	28	8	14
16.	21	30	13	26
17.	20	30	18	27
18.	22	30	16	24
19.	11	16	8	17
	275	439	221	422